# MASTER 2 Computational Neurosciences

## Internship proposal 2025-2026

*(internship from January to June 2026)*

**Host laboratory:** Institut des Sciences Cognitives, UMR 5229 CNRS/UCBL, 67 Bd Pinel, 69675 Bron, France (http://isc.cnrs.fr)

**Host team :** Decision, Action, and Neural Computation (DANC) team (https://www.danclab.com/)

**Internship supervisors :** James Bonaiuto, Chargé de recherche
University / Institution: CNRS/ University Lyon 1
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**Project title : Noninvasive investigation of cortical circuits using MEG and computational modeling**

**Project summary :** Questions regarding the circuit-level neurophysiological basis of perception and cognition have historically been restricted to studies using animal models due to their typically invasive nature and the relative paucity of circuit-level tools available to investigators employing human subjects. In humans, we lack even basic understanding of how such network-level activity patterns are supported by individual neurons, cortical laminae, and the neural circuits that they comprise. This project will aim to bridge this gap using our group's previously developed source reconstruction techniques for inferring the laminar source of MEG signals, developing biophysical computational models of event-related neural fields, and testing these models against the laminar MEG signals. The project will involve heavy use of the python programming language, the MNE toolkit, and the Human Neocortical Neurosolver modeling framework.

**Related publications :**

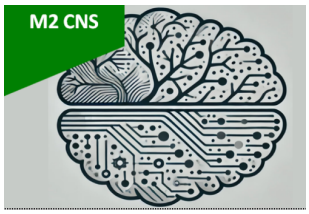
Bonaiuto, J.J., n.d. laMEG: A toolbox for laminar inference with MEG. URL https://danclab.github.io/laMEG/

Bonaiuto, J.J., Afdideh, F., Ferez, M., Wagstyl, K., Mattout, J., Bonnefond, M., Barnes, G.R., Bestmann, S., 2020. Estimates of cortical column orientation improve MEG source inversion. *NeuroImage* 216, 116862.

Bonaiuto, J.J., Little, S., Neymotin, S.A., Jones, S.R., Barnes, G.R., Bestmann, S., 2021. Laminar dynamics of high amplitude beta bursts in human motor cortex. *NeuroImage* 242, 118479.

Bonaiuto, James J, Meyer, S.S., Little, S., Rossiter, H., Callaghan, M.F., Dick, F., Barnes, G.R., Bestmann, S., 2018. Lamina-specific cortical dynamics in human visual and sensorimotor cortices. *eLife* 7, e33977.

Please send your proposal to matteo.divolo@univ-lyon1.fr for publication on the Master of Neuroscience website.




Bonaiuto, J.J., Rossiter, H.E., Meyer, S.S., Adams, N., Little, S., Callaghan, M.F., Dick, F., Bestmann, S., Barnes, G.R., 2018. Non-invasive laminar inference with MEG: Comparison of methods and source inversion algorithms. *NeuroImage* 167, 372–383.